Difference in Overlandflow Generation in Granite, Gneiss and Sedimentary rock Catchments, Korea

YUKIYA TANAKA, A.ORKHONSELENGE, SONG-HYUN KIM

Department of Geography, Kyung Hee University

In order to measure overlandflow generation and sediment discharge, field experimental plots were established on downslopes, 27-32 degree slopes with granite (Gr1, Gr2), gneiss (Gn) and sedimentary rock (Se) catchments. The plots were located according to uniform slope steepness and on smooth surfaces with natural vegetation. Monitoring of plots extended over a six month period from April to October, 2005. Plot surface areas ($10.5m^2$) were defined by two sidewalls of 3m length, one upper wall of 3 m length and the lower triangular apron contact. The walls were made of about 20cm high damp plastic cloth. The floor of the triangle was excavated to a 20cm depth under the soil surface and a plastic collecting drum was half buried and connected to the pipe. At the apex of apron, a 60cm internal plastic pipe was inserted to convey water and surface sediment in the approximately 45 liter sediment collector drum. Sediment yields were collected manually from the $10.5cm^2$ surface areas by brushing into plastic container drums every month after substantial rainfall. The runoff was measured by specially designed pre-calibrated flumes, equipped with water-depth probes. Sediment yields in plots were calculated from periodic sediment samples taken throughout the hydrograph. The highest surface water discharge and surface erosion were generated in Gr1 and Gr2 catchments, whereas surface water discharge and surface erosion were not generated in the Se catchment during the observation period. The highest sedimentation rate occurred at 1.21 g/l due to heavy rainfall event on June 27 in Gr1 catchment. In July and August, the highest sedimentation occurred in Gr2 catchment, where sedimentation rates were 0.26 g/l and 0.12 g/l, respectively. In Gn, the surface water discharge and sediment discharge were almost not generated during the observation period. However, a surface water and sediment discharges occurred as a result of extremely heavy rainfall event on August 11. The Se had no occurrence of surface soil erosion and sedimentation during the observation period. This indicates that the surface soil has low soil erodibility by surface flow during

heavy rainfall. Generally, in terms of soil erosion and sedimentation rates compared to the other plots, the Gr2 had highest erosion and sedimentation rates in July and August. It is concluded that overlandflow occurs frequently in granite drainage basins but almost no overlandflow occurrence in sedimentary rock. In gneiss drainage basin, overlandflow occurs only associating with heavy rainfall event.